

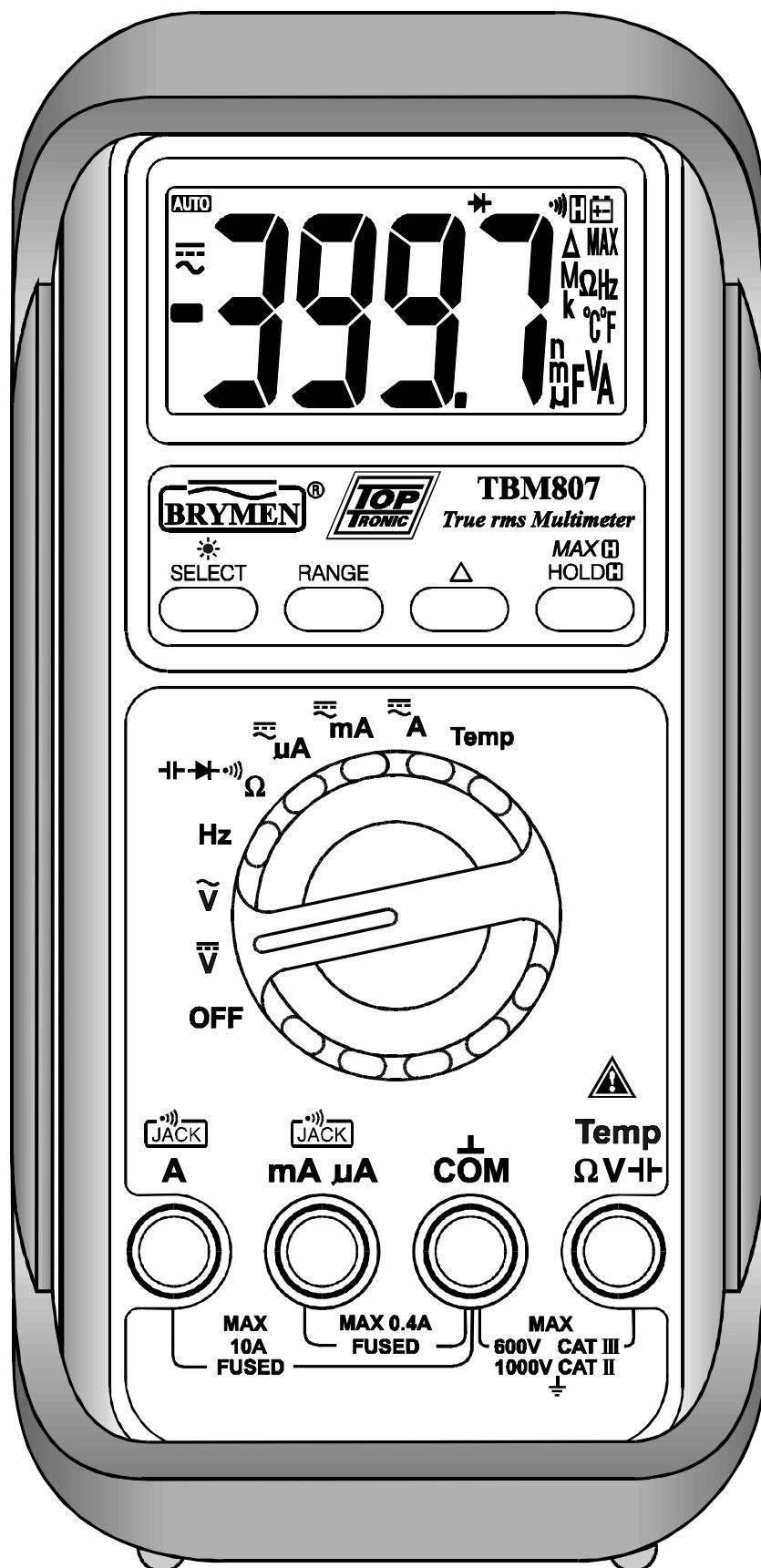
# USER'S MANUAL

**TBM805**

**TBM806**

**TBM807**

**Practical  
Multimeters**



## 1) SAFETY

This manual contains information and warnings that must be followed for operating the instrument safely and maintaining the instrument in a safe operating condition. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired. The meter is intended only for indoor use.

The meter (all versions) is protected, against the users, by double insulation per UL3111-1(1994), CSA C22.2 No. 1010-1-92, EN61010-1(1995) and IEC61010-1(1995) to CAT II 1000V & CAT III 600V.

Terminals (to COM) ratings:

V : Category II 1000 Volts AC & DC, and Category III 600 Volts AC & DC.

A / mA $\mu$ A : Category III 500 Volts AC and 300 Volts DC.

### **PER IEC61010 OVERVOLTAGE INSTALLATION CATEGORY**

#### **OVERVOLTAGE CATEGORY II**

Equipment of OVERVOLTAGE CATEGORY II is energy-consuming equipment to be supplied from the fixed installation.

Note – Examples include household, office, and laboratory appliances.

#### **OVERVOLTAGE CATEGORY III**

Equipment of OVERVOLTAGE CATEGORY III is equipment in fixed installations.

Note – Examples include switches in the fixed installation and some equipment for industrial use with permanent connection to the fixed installation.

#### **Terms in this manual:**

**WARNING** identifies conditions and actions that could result in serious injury or even death to the user.

**CAUTION** identifies conditions and actions that could cause damage or malfunction in the instrument.

## **WARNING**

To reduce the risk of fire or electric shock, do not expose this product to rain or moisture. To avoid electrical shock hazard, observe the proper safety precautions when working with voltages above 60 VDC or 30 VAC rms. These voltage levels pose a potential shock hazard to the user. Do not touch test lead tips or the circuit being tested while power is applied to the circuit being measured. Keep your fingers behind the finger guards of the test leads during measurement. Inspect test leads, connectors, and probes for damaged insulation or exposed metal before using the instrument. If any defects are found, replace them immediately. Do not measure any current that exceeds the current rating of the protection fuse. Do not attempt a current measurement to any circuit where the open circuit voltage is above the protection fuse voltage rating. Suspected open circuit voltage should be checked with voltage functions. Never attempt a voltage measurement with the test lead inserted into the  $\mu$ A/mA or A input jack. Only replace the blown fuse with the proper rating as specified in this manual.

## **CAUTION**

Disconnect the test leads from the test points before changing functions. Always set the instrument to the highest range and work downward for an unknown value when using manual ranging mode.

## **INTERNATIONAL ELECTRICAL SYMBOLS**

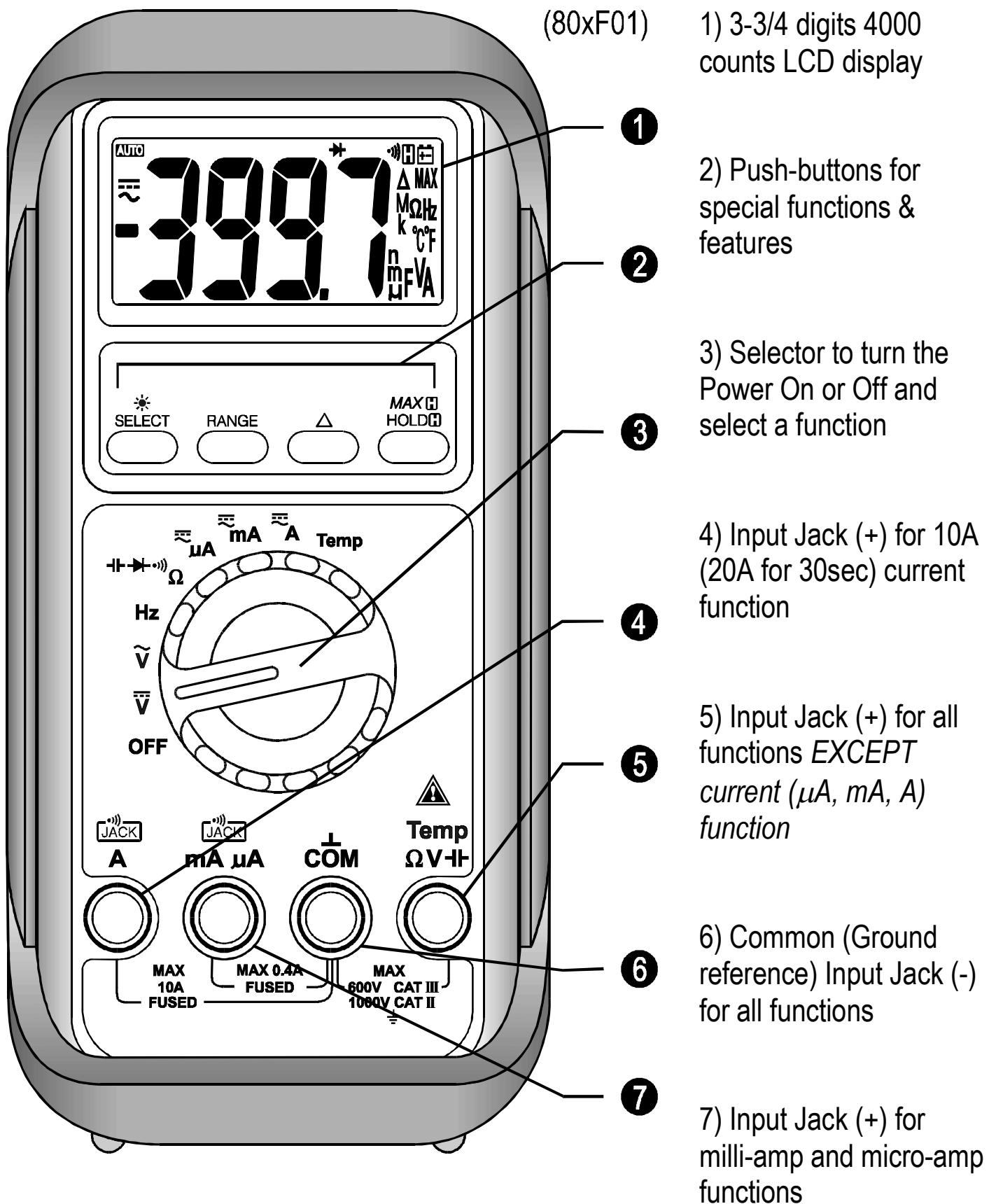
-  Caution ! Refer to the explanation in this Manual
-  Caution ! Risk of electric shock
-  Earth (Ground)
-  Double Insulation or Reinforced insulation
-  Fuse
-  AC--Alternating Current
-  DC--Direct Current

## **2) CENELEC DIRECTIVES**

The instruments conform to CENELEC Low-voltage directive 73/23/EEC and Electromagnetic compatibility directive 89/336/EEC

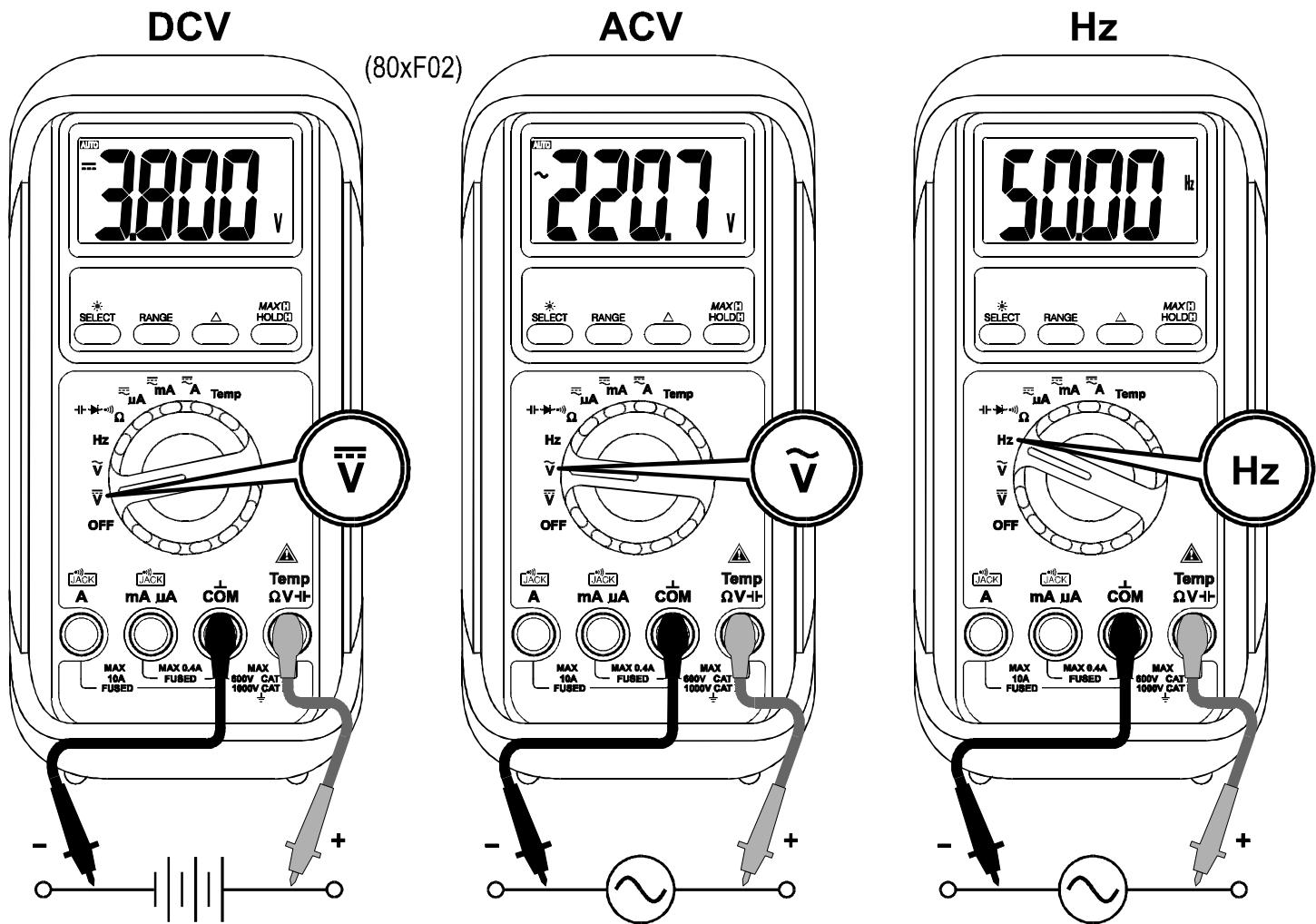
### 3) PRODUCT DESCRIPTION

This user's manual uses only representative model for illustrations. Please refer specification details for function availability to each model.



## 4) OPERATION

### DC Voltage, AC Voltage, & Hz Frequency functions



#### CAUTION

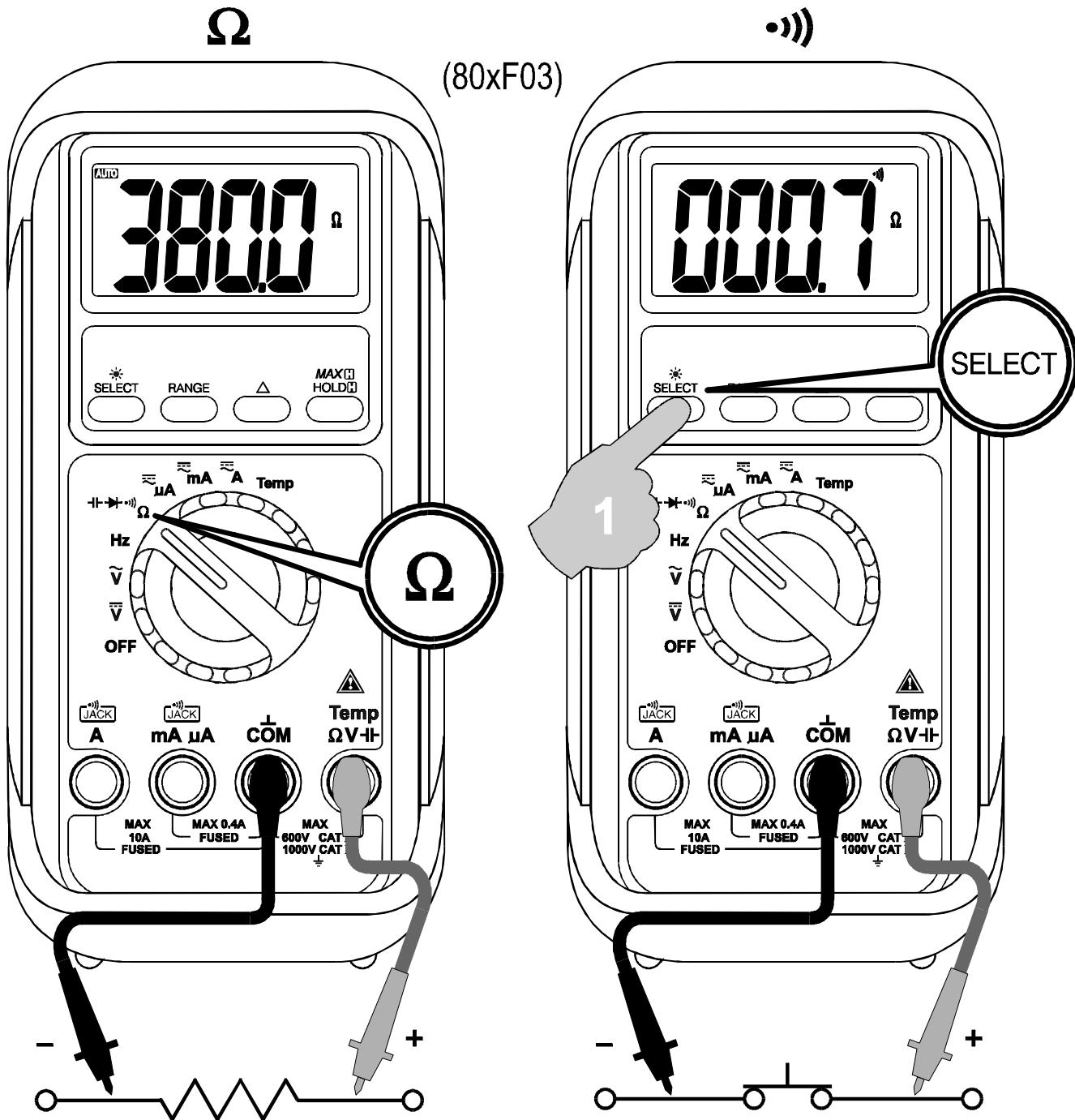
Before and after hazardous voltage measurements, test the voltage function on a known source such as line voltage to determine proper meter functioning.

#### Note:

- 1) AC 400.0mV range selection is by RANGE button manually, and is specified from AC 10mV (AC 40mV for True RMS model BM807) and up.
- 2) DC 400.0mV range is designed with  $1000M\Omega$  high input impedance for least current drain in measuring small signals, and can cope better with most commercially available voltage output transducers and adapters. The non-zero display reading is normal when the meter inputs are open circuit, which will not affect actual measurement accuracy. Open input is actually a floating condition, which is not a zero-volt-input condition. The meter will show zero or close to zero reading when the inputs are shorted.

## $\Omega$ Resistance, and $\cdot\cdot\cdot$ Continuity functions

Defaults at  $\Omega$ . Press **SELECT** button momentarily to select  $\cdot\cdot\cdot$  Continuity function which is convenient for checking wiring connections and operation of switches. A continuous beep tone indicates a complete wire.



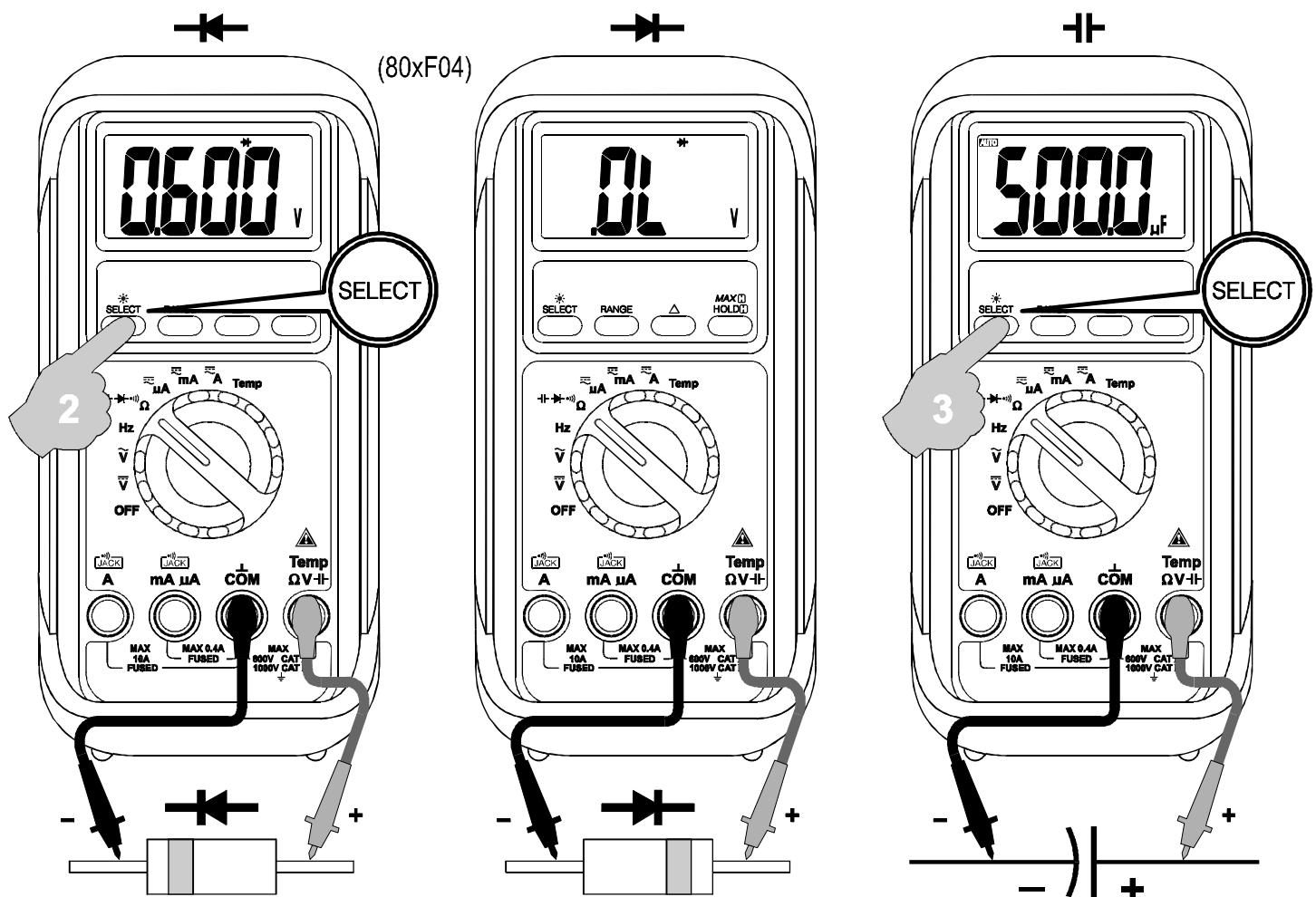
### **CAUTION**

Using Resistance, Continuity, Diode or Capacitance function in a live circuit will produce false results and may damage the instrument. In many cases the suspected component must be disconnected from the circuit to obtain an accurate measurement reading.

## ➔ Diode test, ➡ Capacitance functions

Defaults at  $\Omega$ . Press **SELECT** button momentarily 2 times to select ➔ Diode test function. Normal forward voltage drop (forward biased) for a good silicon diode is between 0.400V to 0.900V. A reading higher than that indicates a leaky diode (defective). A zero reading indicates a shorted diode (defective). An OL indicates an open diode (defective). Reverse the test leads connections (reverse biased) across the diode. The digital display shows OL if the diode is good. Any other readings indicate the diode is resistive or shorted (defective).

Defaults at  $\Omega$ . Press **SELECT** button momentarily 3 times to select ➡ Capacitance function. Relative zero  $\Delta$  mode can be used to zero out the parasitic capacitance of the leads and the internal protection circuitry of the meter when measuring low capacitance in the order of Pico Farad (pF).

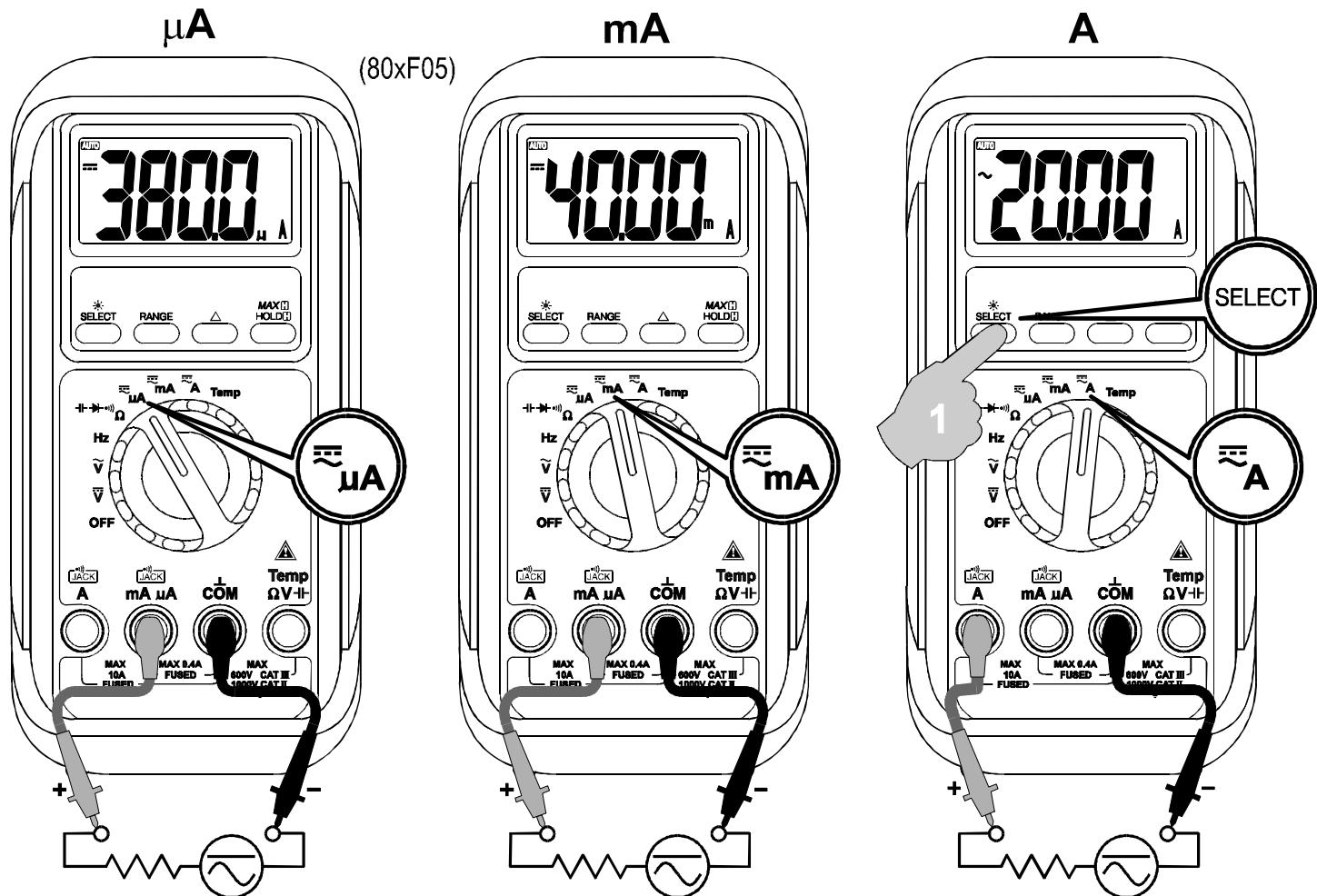


### CAUTION

Discharge capacitors before making any measurement. Large value capacitors should be discharged through an appropriate resistance load

## $\mu$ A, mA, and A Current functions

Default at DC. Press **SELECT** button momentarily to select AC.



### CAUTION

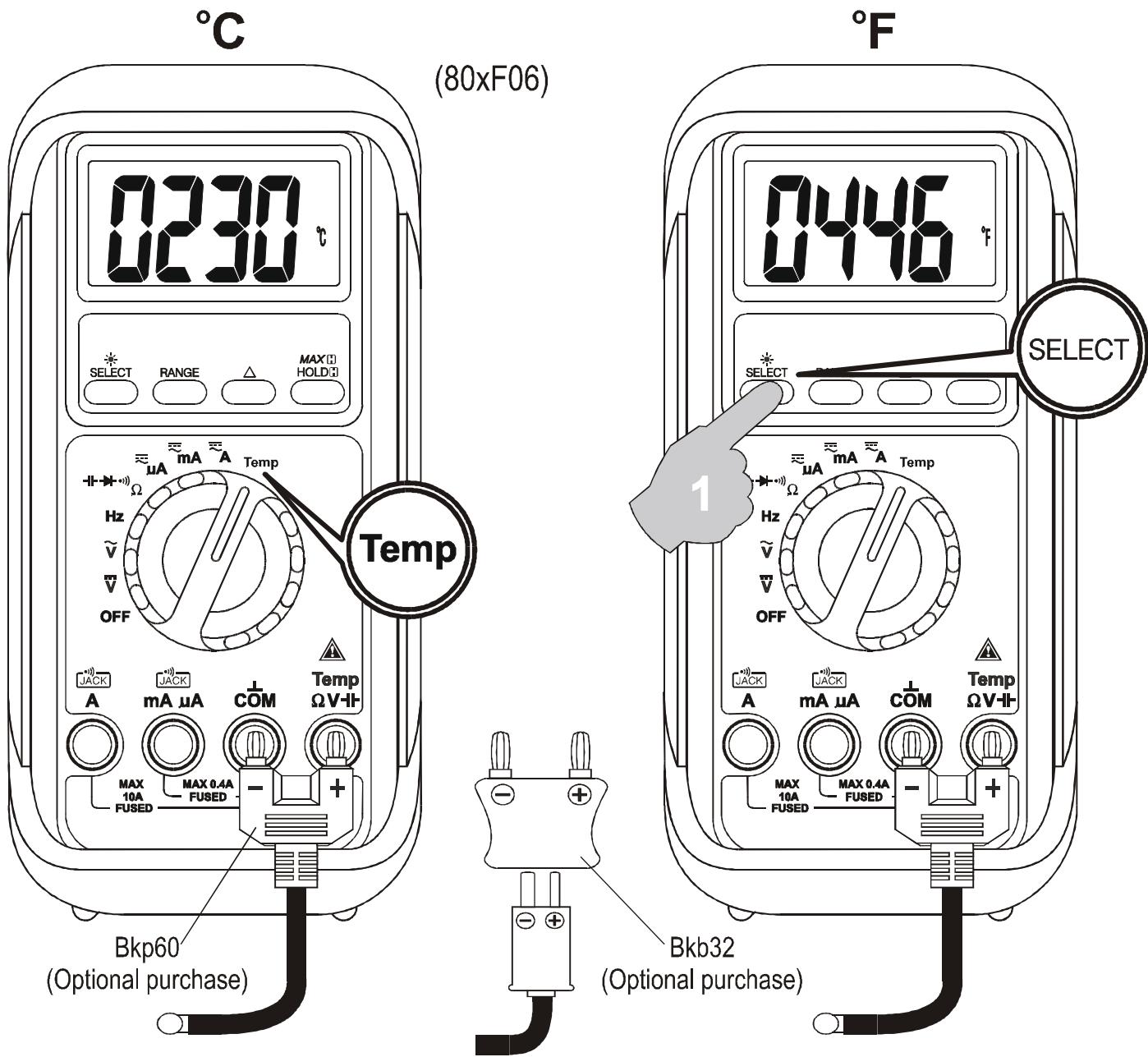
When measuring a 3-phase system, special attention should be taken to the phase-to-phase voltage which is significantly higher than the phase-to-earth voltage. To avoid exceeding the voltage rating of the protection fuse(s) accidentally, always consider the phase-to-phase voltage as the working voltage for the protection fuse(s).

### Beep-Jack™ Input Warning

The meter beeps to warn the user against possible damage to the meter due to improper connections to the  $\mu$ A, mA, or A input jacks when other function (like voltage function) is selected.

## Temperature function (BM806 & BM807 only)

Be sure to insert the banana plug type-K temperature bead probe Bkp60 (Optional purchase) with correct **+** **-** polarities. Defaults at degree C (Celsius). Press SELECT button momentarily to select degree F (Fahrenheit). You can also use a plug adapter Bkb32 (Optional purchase) with banana pins to type-K socket to adapt other type-K standard mini plug temperature probes.



## Relative zero $\Delta$ mode

Relative zero  $\Delta$  mode allows the user to offset the meter consecutive measurements with the displaying reading as the reference value. The display will now show readings relative to the stored reference value. That is, display = reading - stored value. Press the  $\Delta$  button momentarily to activate or to exit relative zero mode.

## **Backlighted display**

Press the **SELECT** button for 1 second or more to turn on or off the display backlight function.

## **Manual or Auto-ranging**

Press the **RANGE** button momentarily to select manual-ranging mode, and the meter will remain in the range it was in, the LCD annunciator **AUTO** turns off. Press the button momentarily again to step through the ranges. Press and hold the button for 1 second or more to resume auto-ranging mode.

Note: Manual ranging mode feature is not available in Hz & Cx functions.

## **HOLD**

The hold feature freezes the display for later view. Press the **HOLD** button momentarily to activate or to exit the hold feature.

## **MAX**

The max feature compares and displays the measured maximum value as fast as 25ms in a single range, and with automatic up range capability. Press the **MAX** button for 1 second or more to activate or to exit the max feature in the voltage or current functions.

## **Sleep Mode**

The meter will enter a low power consumption sleep mode automatically to extend battery life after approximately 30 minutes of no rotary-switch or push button operations. To wake up the meter from sleep mode, press any buttons momentarily or turn the rotary-switch to an adjacent position. Always set the rotary-switch to the OFF position manually when the meter is not in use.

## **5) MAINTENANCE**

### **WARNING**

To avoid electrical shock, disconnect the meter from any circuit, remove the test leads from the input jacks and turn OFF the meter before opening the case. Do not operate with open case.

### **Cleaning and Storage**

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. If the meter is not to be used for periods of longer than 60 days, remove the batteries and store them separately

## Trouble Shooting

If the instrument fails to operate, check batteries and test leads etc., and replace as necessary. Double check operating procedure as described in this user's manual.

If the instrument voltage-resistance input terminal has subjected to high voltage transient (caused by lightning or switching surge to the system) by accident or abnormal conditions of operation, the series fusible resistors will be blown off (become high impedance) like fuses to protect the user and the instrument. Most measuring functions through this terminal will then be open circuit. The series fusible resistors and the spark gaps should then be replaced by qualified technician. Refer to the LIMITED WARRANTY section for obtaining warranty or repairing service.

## Battery and Fuse replacement

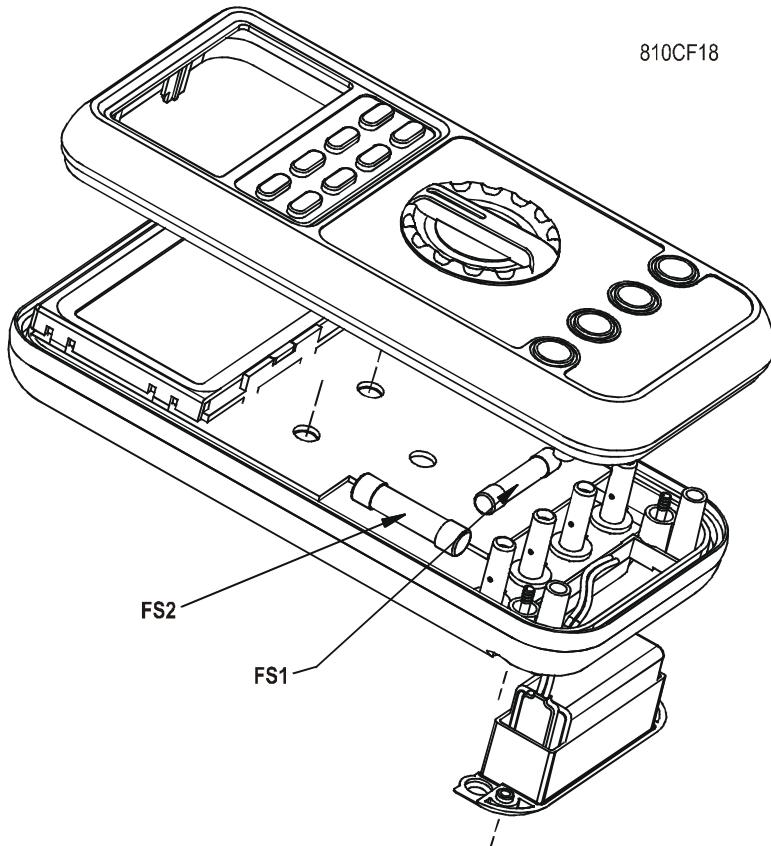
### Battery use:

Standard 1.5V AAA Size (NEDA 24A or IEC LR03) battery X 2

### Fuses:

Fuse (FS1) for  $\mu$ AmA current input: 0.63A/500V, IR 200kA, F fuse;

Fuse (FS2) for A current input: 12.5A/500V, IR 20kA, F fuse



### *Battery replacement for models with battery access door:*

Loosen the 2 screws from the battery access door of the case bottom. Lift the battery access door and thus the battery compartment up. Replace the battery. Re-fasten the screws.

### *Fuse replacement (and also Battery replacement for splash proof version without battery access door):*

Loosen the 4 screws from the case bottom. Lift the end of the case bottom nearest the input jacks until it unsnaps from the case top. Replace the blown fuse(s) and/or the battery. Replace the case bottom, and ensure that all the gaskets are properly seated and the two snaps on the case top (near the LCD side) are engaged. Re-fasten the screws.

## 6) SPECIFICATIONS

### GENERAL SPECIFICATIONS

**Display :** 3-3/4 digits 4000 counts LCD display

**Polarity :** Automatic

**Update Rate :** 3 per second nominal

**Operating Temperature :** 0°C to 40°C

**Relative Humidity :** Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C

**Altitude :** Operating below 2000m

**Pollution degree :** 2

**Storage Temperature :** -20°C to 60°C, < 80% R.H. (with battery removed)

**Temperature Coefficient :** nominal  $0.15 \times (\text{specified accuracy})/{}^{\circ}\text{C}$  @ (0°C -18°C or 28°C - 40°C), or otherwise specified

**Sensing :** Average sensing for BM805 & BM806. True RMS for BM807

**Safety :** The meter (all versions) is protected, against the users, by double insulation per UL3111-1(1994), CSA C22.2 No. 1010-1-92, EN61010-1(1995) and IEC61010-1(1995) to CAT II 1000V & CAT III 600V.

**Terminals (to COM) ratings:**

V : Category II 1000 Volts AC & DC, and Category III 600 Volts AC & DC.

A / mA $\mu$ A : Category III 500 Volts AC and 300 Volts DC.

**Overload Protections :**

$\mu$ A & mA : 0.63A/500V, IR200kA, F Fuse;

A : 12.5A/500V, IR20kA, F Fuse;

V : 1050Vrms, 1450Vpeak;

$\Omega$ , & Others : 600VDC/VAC rms

**Transient protection :** 6.5kV (1.2/50 $\mu$ s surge)

**Power Supply :** 1.5V AAA Size (NEDA 24A or IEC LR03) battery X 2

**Power Consumption :** 3.2 mA typical

**Low Battery :** Below approx. 2.4V

**E.M.C. :** Meets EN61326(1997, 1998/A1), EN61000-4-2(1995), and EN61000-4-3(1996)

In an RF field of 3V/m:

Capacitance function is not specified

AC 4.000V range: Total Accuracy = Specified Accuracy + 700 digits

AC 400.0 $\mu$ A range: Total Accuracy = Specified Accuracy + 300 digits

Other function ranges: Total Accuracy = Specified Accuracy + 40 digits

Performance above 3V/m is not specified

**Sleep Mode Timing :** Idle for 30 minutes

**Sleep Mode Consumption :** 300 $\mu$ A typical for BM805 & BM806; 360 $\mu$ A typical for BM807

**Dimension:** L186mm X W87mm X H35.5mm; L198mm X W97mm X H55mm with holster

**Weight:** 296 gm; 396 gm with holster

**Special Features** : 25ms Max Hold; Data Hold; Relative zero mode; Beep-jack™ input warning; Back-lighted display (BM807 only)

**Accessories** : Test leads (pair), batteries installed, user's manual

**Optional Accessories** : Banana plug type-K bead probe Bkp60 x 1 (BM806 & BM807 only), Banana pins to type-K socket plug adapter Bkb32 (BM806 & BM807 only)

## ELECTRICAL SPECIFICATIONS

Accuracy is  $\pm$ (% reading digits + number of digits) or otherwise specified, at  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$  & less than 75% R.H.

<sup>1)</sup> Model BM807 True RMS accuracy of ACV & ACA is specified from 5 % (10% for AC400.0mV range) to 100 % of range, or otherwise specified. Maximum Crest Factor < 1.75 : 1 at full scale & < 3.5 : 1 at half scale, and with frequency components within the specified frequency bandwidth for non-sinusoidal waveforms

### DC Voltage

RANGE	Accuracy
400.0 mV	0.3% + 4d
4.000V, 40.00V, 400.0V	0.5% + 3d
1000V	1.0% + 4d

NMRR : >50dB @ 50/60Hz

CMRR : >120dB @ DC, 50/60Hz,  $\text{Rs}=1\text{k}\Omega$

Input Impedance :  $10\text{M}\Omega$ , 30pF nominal  
( $1000\text{M}\Omega$  for 400.0mV range)

### Max Hold (Voltage & Current)

Specified accuracy  $\pm$  50 digits for changes  
> 25ms in duration

### AC Voltage

RANGE	Accuracy <sup>1)</sup>
<b>50Hz -- 500Hz</b>	
400.0mV*	4.0% + 5d
4.000V, 40.00V, 400.0V	1.5% + 5d
1000V	4.0% + 5d

CMRR : >60dB @ DC to 60Hz,  $\text{Rs}=1\text{k}\Omega$

Input Impedance :  $10\text{M}\Omega$ , 30pF nominal

\*Selection by RANGE button manually, and is specified from AC 10mV (AC 40mV for True RMS model BM807) and up

### DC Current

RANGE	Accuracy	Burden Voltage
400.0 $\mu\text{A}$	2.0% + 5d	0.15mV/ $\mu\text{A}$
4000 $\mu\text{A}$	1.2% + 3d	0.15mV/ $\mu\text{A}$
40.00mA	2.0% + 5d	3.3mV/mA
400.0mA	1.2% + 3d	3.3mV/mA
4.000A	2.0% + 5d	0.03V/A
10.00A*	1.2% + 3d	0.03V/A

\*10A continuous, 20A for 30 second max with 5 minutes cool down interval

**AC Current**

<b>RANGE</b>	<b>Accuracy<sup>1)</sup></b>	<b>Burden Voltage</b>
<b>50Hz -- 500Hz</b>		
400.0 $\mu$ A	2.0% + 6d	0.15mV/ $\mu$ A
4000 $\mu$ A	1.5% + 4d	0.15mV/ $\mu$ A
40.00mA	2.0% + 6d	3.3mV/mA
400.0mA	1.7% + 4d	3.3mV/mA
4.000A	2.0% + 6d	0.03V/A
10.00A*	1.8% + 4d	0.03V/A

\*10A continuous, 20A for 30 second max with 5 minutes cool down interval

**Diode Tester**

Open Circuit Voltage	Test Current (Typical)
< 1.6 VDC	0.25mA

**Type-K Temperature (BM806 & BM807)**

<b>RANGE</b>	<b>Accuracy*</b>
-20 °C TO 300 °C	2% + 3 °C
-4 °F TO 572 °F	2% + 6 °F

\*Type-K thermocouple range & accuracy not included

**Audible Continuity Tester**

Audible threshold : between 10 $\Omega$  and 120 $\Omega$

**Ohms**

<b>RANGE</b>	<b>Accuracy</b>
400.0 $\Omega$	0.8% + 6d
4.000k $\Omega$ , 40.00k $\Omega$ ,	0.6% + 4d
400.0k $\Omega$	
4.000M $\Omega$	1.0% + 4d
40.00M $\Omega$	2.0% + 4d

Open Circuit Voltage : 0.4VDC typical

**Capacitance**

<b>RANGE*</b>	<b>Accuracy**</b>
500.0nF, 5.000 $\mu$ F, 50.00 $\mu$ F, 500.0 $\mu$ F, 3000 $\mu$ F	3.5%*** + 6d

\*Additional 50.00nF range accuracy is not specified

\*\*Accuracies with film capacitor or better

\*\*\*Specified with battery voltage above 2.8V (approximately half full battery). Accuracy decreases gradually to 12% at low battery warning voltage of approximately 2.4V

**Hz Frequency**

<b>RANGE*</b>	<b>Accuracy**</b>
50.00Hz, 500.0Hz, 5.000kHz, 50.00kHz, 500.0kHz, 1.000MHz	0.5%+4d

\*Additional 5.000Hz range accuracy & sensitivity are not specified

\*\*Accuracy is specified at < 20VAC rms

Input Signal : Square wave with duty cycle >

40% & < 70%; or Sine wave Vrms AC

Sensitivity :

10Hz--20Hz : > Sine 0.9Vrms;

20Hz--500kHz : > 2.6Vp; or Sine 1.9Vrms;

500kHz--1MHz : > 4.2Vp; or Sine 3Vrms

Update Rate : 2 per second nominal

## LIMITED WARRANTY

BRYMEN warrants to the original product purchaser that each product it manufactures will be free from defects in material and workmanship under normal use and service within a period of one year from the date of purchase. BRYMEN's warranty does not apply to accessories, fuses, fusible resistors, spark gaps, batteries or any product which, in BRYMEN's opinion, has been misused, altered, neglected, or damaged by accident or abnormal conditions of operation or handling.

To obtain warranty service, contact your nearest BRYMEN authorized agent or send the product, with proof of purchase and description of the difficulty, postage and insurance prepaid, to BRYMEN TECHNOLOGY CORPORATION. BRYMEN assumes no risk for damage in transit. BRYMEN will, at its option, repair or replace the defective product free of charge. However, if BRYMEN determines that the failure was caused by misused, altered, neglected, or damaged by accident or abnormal conditions of operation or handling, you will be billed for the repair.

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